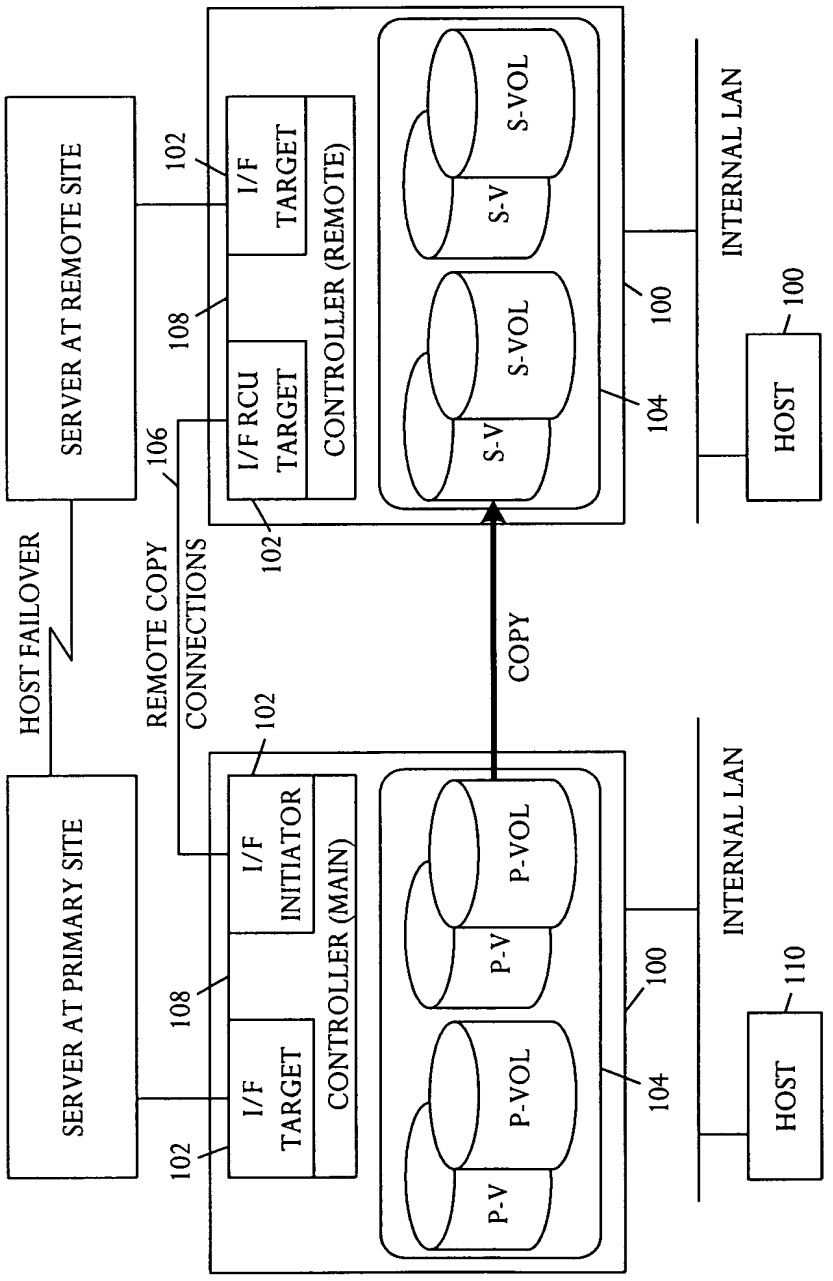

SERVER AT REMOTE SITE
SERVER AT PRIMARY SITE
HOST FAILOVER
REMOTE COPY CONNECTIONS
COPY
I/F TARGET
I/F RCU TARGET
CONTROLLER (REMOTE)
I/F INITIATOR
I/F TARGET
CONTROLLER (MAIN)
S-V
S-VOL
P-V
P-VOL
INTERNAL LAN
HOST
100
102
104
106
108
110

FIG. 1

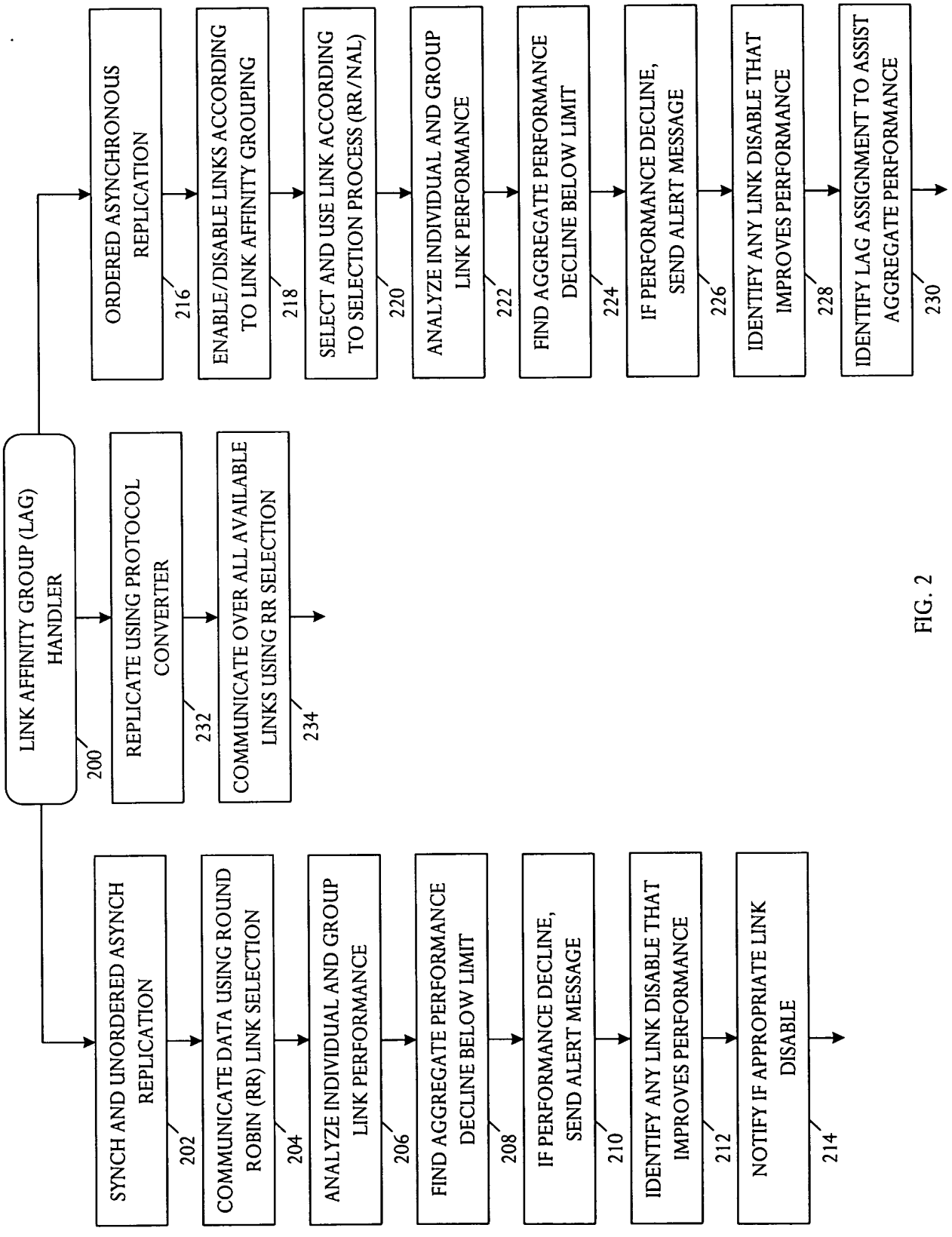

LINK AFFINITY GROUP (LAG) HANDLER
200
SYNCH AND UNORDERED ASYNCH REPLICATION
202
COMMUNICATE DATA USING ROUND ROBIN (RR) LINK SELECTION
204
ANALYZE INDIVIDUAL AND GROUP LINK PERFORMANCE
206
FIND AGGREGATE PERFORMANCE DECLINE BELOW LIMIT
208
IF PERFORMANCE DECLINE, SEND ALERT MESSAGE
210
IDENTIFY ANY LINK DISABLE THAT IMPROVES PERFORMANCE
212
NOTIFY IF APPROPRIATE LINK DISABLE
214
REPLICATE USING PROTOCOL CONVERTER
232
COMMUNICATE OVER ALL AVAILABLE LINKS USING RR SELECTION
234
ORDERED ASYNCHRONOUS REPLICATION
216
ENABLE/DISABLE LINKS ACCORDING TO LINK AFFINITY GROUPING
218
SELECT AND USE LINK ACCORDING TO SELECTION PROCESS (RR/NAL)
220
ANALYZE INDIVIDUAL AND GROUP LINK PERFORMANCE
222
FIND AGGREGATE PERFORMANCE DECLINE BELOW LIMIT
224
IF PERFORMANCE DECLINE, SEND ALERT MESSAGE
226
IDENTIFY ANY LINK DISABLE THAT IMPROVES PERFORMANCE
228
IDENTIFY LAG ASSIGNMENT TO ASSIST AGGREGATE PERFORMANCE
230

FIG. 2

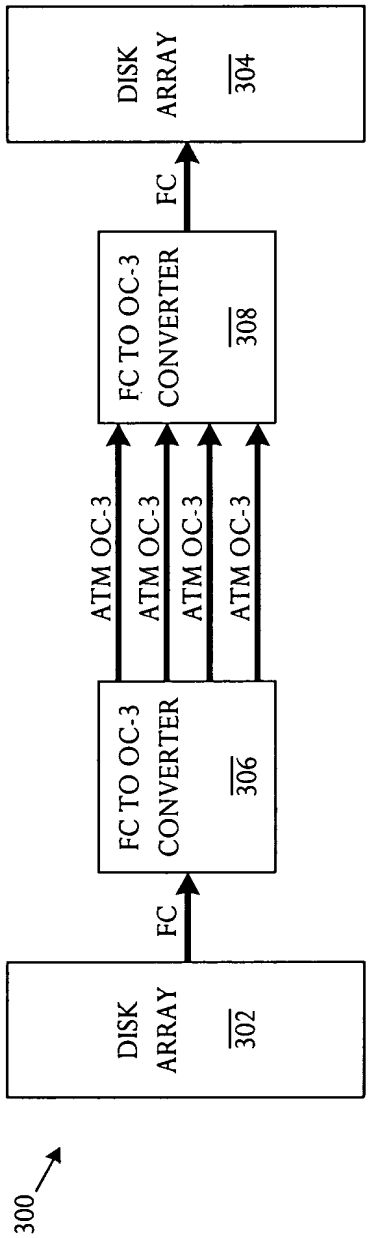

DISK ARRAY 304
FC
FC TO OC-3 CONVERTER 308
ATM OC-3
ATM OC-3
ATM OC-3
ATM OC-3
FC TO OC-3 CONVERTER 306
FC
DISK ARRAY 302
300

FIG. 3

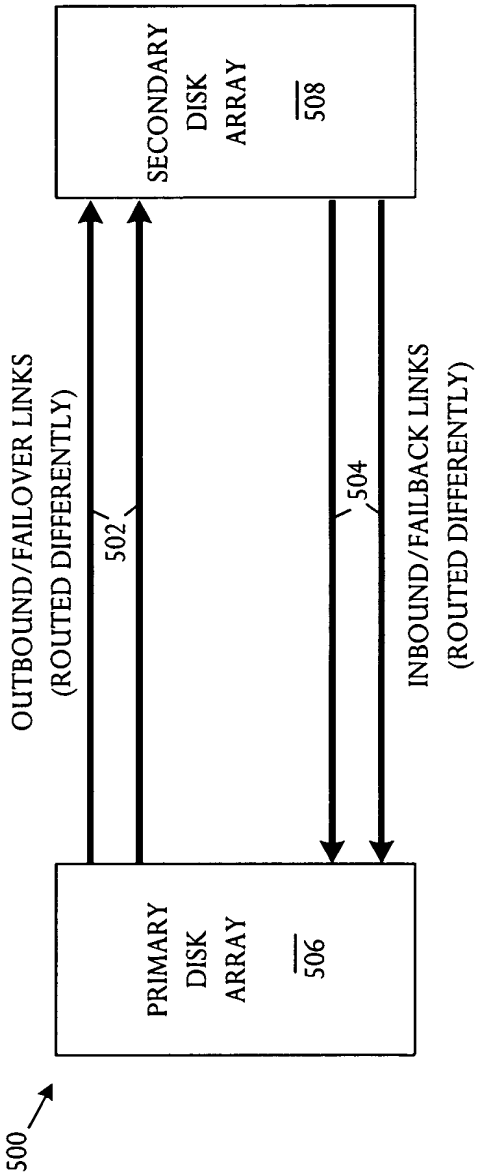

SECONDARY DISK ARRAY 508
OUTBOUND/FAILOVER LINKS (ROUTED DIFFERENTLY)
502
504
INBOUND/FAILBACK LINKS (ROUTED DIFFERENTLY)
PRIMARY DISK ARRAY 506
500

FIG. 5

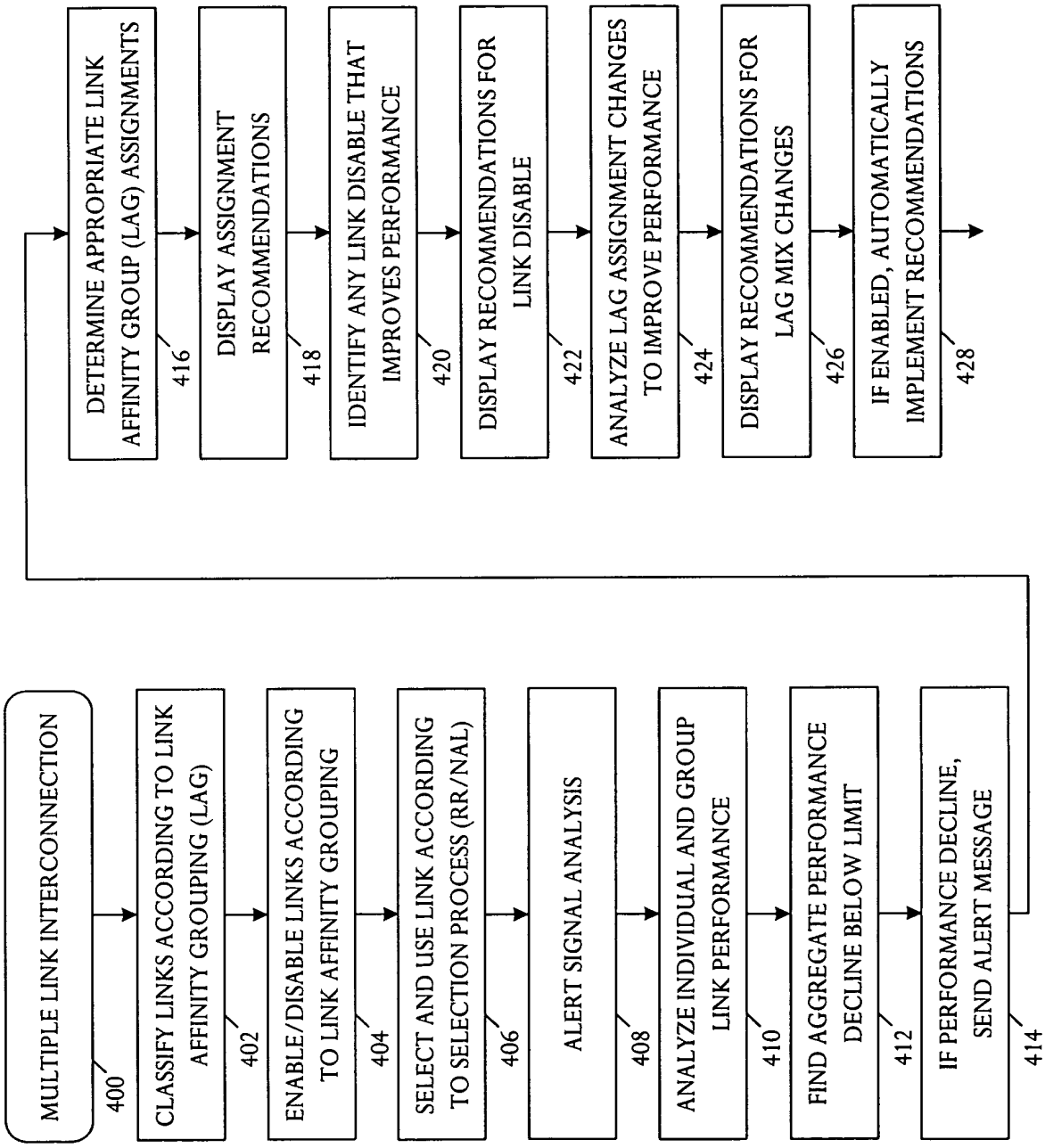
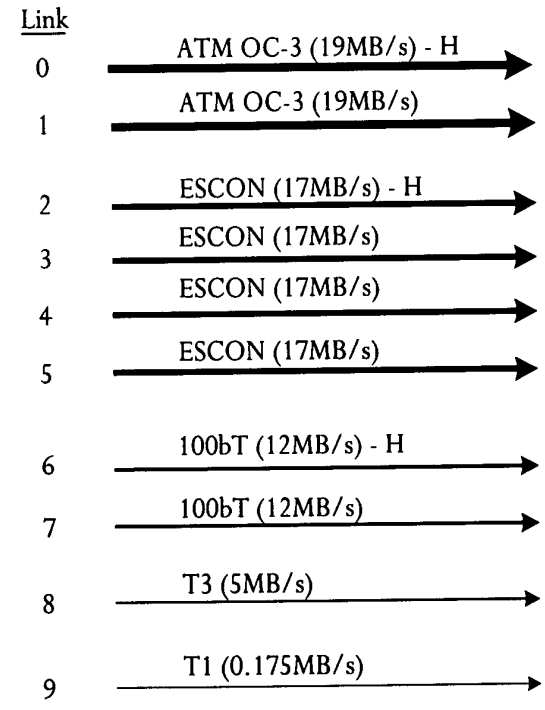

MULTIPLE LINK INTERCONNECTION
400
CLASSIFY LINKS ACCORDING TO LINK AFFINITY GROUPING (LAG)
402
ENABLE/DISABLE LINKS ACCORDING TO LINK AFFINITY GROUPING
404
SELECT AND USE LINK ACCORDING TO SELECTION PROCESS (RR/NAL)
406
ALERT SIGNAL ANALYSIS
408
ANALYZE INDIVIDUAL AND GROUP LINK PERFORMANCE
410
FIND AGGREGATE PERFORMANCE DECLINE BELOW LIMIT
412
IF PERFORMANCE DECLINE, SEND ALERT MESSAGE
414
DETERMINE APPROPRIATE LINK AFFINITY GROUP (LAG) ASSIGNMENTS
416
DISPLAY ASSIGNMENT RECOMMENDATIONS
418
IDENTIFY ANY LINK DISABLE THAT IMPROVES PERFORMANCE
420
DISPLAY RECOMMENDATIONS FOR LINK DISABLE
422
ANALYZE LAG ASSIGNMENT CHANGES TO IMPROVE PERFORMANCE
424
DISPLAY RECOMMENDATIONS FOR LAG MIX CHANGES
426
IF ENABLED, AUTOMATICALLY IMPLEMENT RECOMMENDATIONS
428

FIG. 4

Link 0	1	2	3	4	5	6	7	8	9	LAG	Comments	Suitable For RR	NAL	HA
X	X									a	highest cost mission critical	X	X	X
		X	X	X	X					b	highest throughput group	X	X	X
						X	X			c	100bT LAN group	X	X	X
								X		d	T3 same speed group	X	X	X
									X	e	T1 heartbeat/I'm alive group	X	X	X
X	X	X	X	X	X	X	X	X	X	f	all inclusive group		X	X
X		X			X					g	hardened path inter-LAG group		X	X
X	X	X	X	X						h	top 2 speeds intra-LAG group		X	X
	X	X	X	X	X	X				i	non mission critical inter-LAG		X	X
	X		X				X	X	X	j	group health sampling inter-LAG		X	
X										k	single ATM group	X	X	
	X									l	single ESCON group	X	X	
					X					m	single 100bT (may be shared)	X	X	
						X				n	single 100bT (not shared)	X	X	

FIG. 6



H - hardened security path link
RR - Round Robin algorithm
NAL - Next Available Link Algorithm
HA - Highly Available

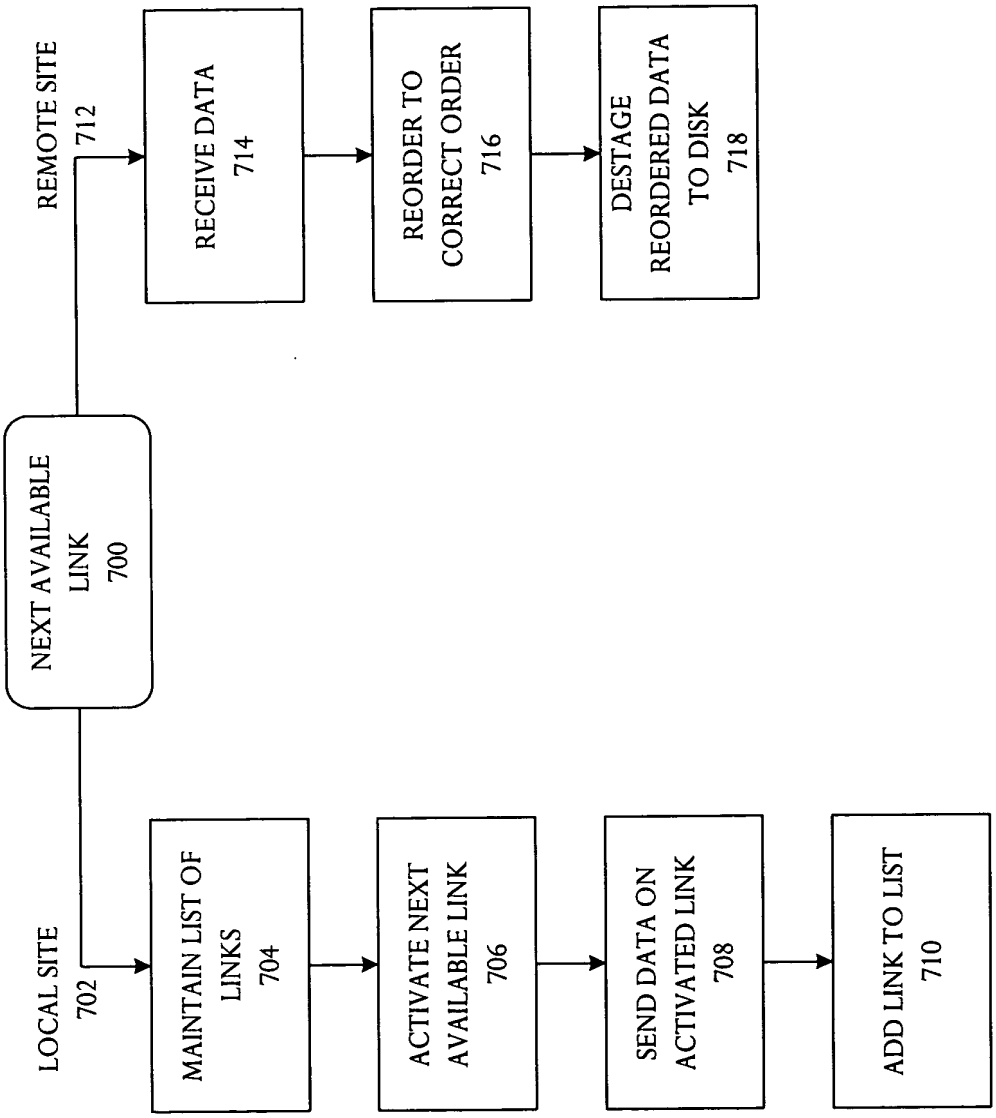

NEXT AVAILABLE LINK 700
REMOTE SITE 712
RECEIVE DATA 714
REORDER TO CORRECT ORDER 716
DESTAGE REORDERED DATA TO DISK 718
LOCAL SITE 702
MAINTAIN LIST OF LINKS 704
ACTIVATE NEXT AVAILABLE LINK 706
SEND DATA ON ACTIVATED LINK 708
ADD LINK TO LIST 710

FIG. 7

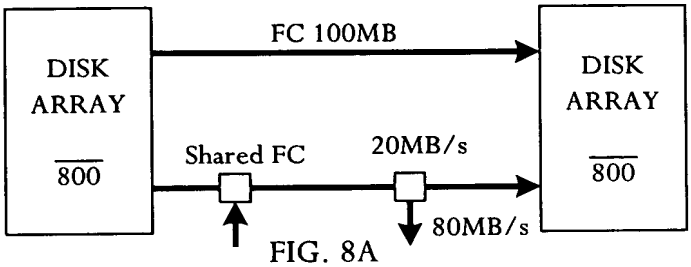


FIG. 8A
(PRIOR ART)

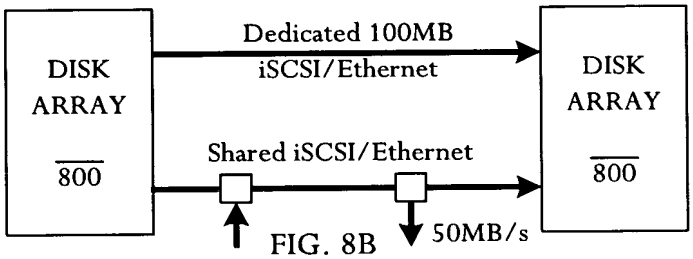


FIG. 8B
(PRIOR ART)

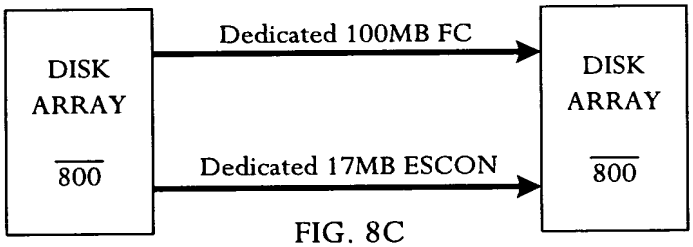


FIG. 8C
(PRIOR ART)

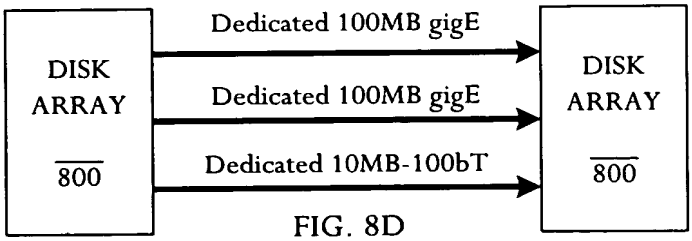


FIG. 8D
(PRIOR ART)